



# Current Pre-Algebra PoW

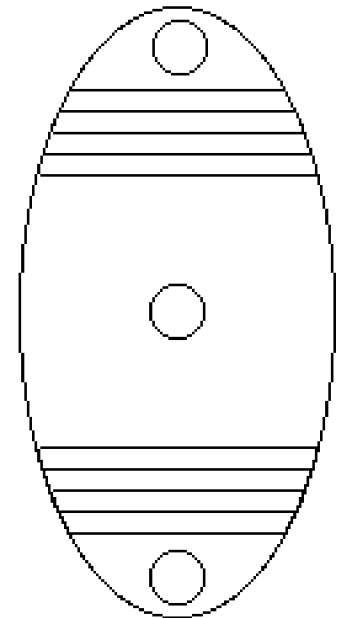
The Math Forum's Problems of the Week provide non-routine constructed response problems. The Pre-Algebra problems target concepts typically learned in grades 6-8. Memberships and mentoring options are available at the individual, class, school, and district levels.

## Totolospo - posted March 24, 2007

The Hopi Indians invented Totolospo, a game of chance. The game is played with three cane dice, a counting board, and a counter for each player. Each cane die can land round side up (r) or flat side up (f).

The moves of the game are determined by tossing the three cane dice with these rules:

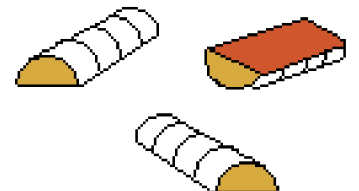
Toss	Move
three round sides up (rrr)	player advances 2 lines
three flat sides up (fff)	player advances 1 line
any other toss of the three cane dice	player doesn't advance



Questions:

1. List all the possible tosses (combinations of cane dice landing positions).
2. If landing round side up or flat side up were equally likely, what is the probability that you will be able to advance your counter on a toss?

**Extra:** Do you think it is actually equally likely for a cane die to land round side up or flat side up?



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Learn more about the PoWs in Booth 2425 or at [http://mathforum.org/problems\\_puzzles\\_landing.html](http://mathforum.org/problems_puzzles_landing.html)

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# Pre-Algebra Scoring Rubric for *Totolosp*

For each category, choose the level that *best describes* the student's work

	Novice	Apprentice	Practitioner	Expert
<b>Problem Solving</b>				
<b>Interpretation</b>	doesn't seem to understand the game or doesn't answer either question	answers only one of the two questions answers both questions, but misunderstands how the game works	understands how the dice could fall and how the game works attempts to find all the combinations of tosses attempts to find the probability of moving	is at least a Practitioner in Strategy and has provided a reasonable and somewhat thoughtful answer to the Extra
<b>Strategy</b>	does not have any ideas about how to solve the problem	does guess and check without being careful – might have gotten lucky not organized when finding list	has a strategy that relies on skill, not luck is organized in finding all the combinations	uses a tree diagram
<b>Accuracy</b>	has made many errors	makes a few errors that lead to an incorrect answer	makes no arithmetic mistakes that really matter	[not normally available for this category]
<b>Communication</b>				
<b>Completeness</b>	has written nothing that tells you how they found their answer	shows work without an explanation or explains everything without showing the numbers doesn't include enough information for another student to follow	attempts to explain all of the steps taken to solve the problem, which might include: <ul style="list-style-type: none"> <li>• how the list of tosses was generated</li> <li>• how it's known the list is complete</li> <li>• how the probability was calculated</li> </ul>	adds in useful extensions and further explanation of some of the ideas involved (for example, why the Counting Principle works)
<b>Clarity</b>	explanation is very difficult to read and follow	another student wouldn't be able to follow their explanation entirely long and written in one paragraph lots of spelling errors/typos	explains all of the steps mentioned in such a way that another student would understand makes an effort to check their formatting, spelling, and typing (a few errors are fine)	formats things exceptionally clearly answer is very readable and appealing
<b>Reflection</b>	<i>The items in the columns to the right are considered reflective, and could be in the solution or the comment they leave after viewing our answer:</i> does nothing reflective	checks their answer (not the same as viewing our "answer check") reflects on the reasonableness of their answer does one reflective thing	connects the problem to prior knowledge or experience explains where they're stuck summarizes the process they used does two reflective things	comments on and explains the ease or difficulty of the problem <b>revising their answer and improving anything</b> does three or more reflective things or a great job with two